Cover Crops Cover a Lot of Possibilities

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Cover crops have been used for centuries. However, today's modern farmers have grown up in a generation or two which has replaced the use of cover crops with fertilizers and herbicides. Benefits of cover crops are broad-based, including:

- Reduce soil erosion and improve water quality
- Improve soil structure
- Add organic matter
- Cut fertilizer costs through recycling of soil nutrients; and 'fixing' soil nitrogen
- Provide weed control
- Furnish moisture-conserving mulch
- Provide supplemental forage for livestock

A single cover crop planting will not provide all of the potential benefits listed above. Each farmer needs to narrow their expectations to one or two primary and perhaps a few secondary goals to simplify the selection of the best cover species for their particular enterprise. To further narrow down choices, each producer also needs to identify how the chosen cover crop will combine or 'fit' within their current cash crops or cropping system plans. Examples of where cover crops might fit into production systems are:

- Winter cover crops, sown in late summer or autumn, and remain in place until spring.
- Smother crops that are grown during a spring, summer or fall period, between cash crops.
- Interseeded into an existing crop that may remain in place for varying amounts of time
- Fallow crops that require taking land out of crop production for all or part of a season.

Types of Cover Crops

Cover crop species fit into four main categories: grasses, legumes, other broadleaf species, and mixtures. **Grasses** are often used when nitrogen contribution to the soil is not a priority. They tend to grow rapidly and thus are better at short-term weed suppression than are legumes. **Legumes** are used when "free" nitrogen is desired for a subsequent cash crop with a high nitrogen demand. Legumes generally require good soil drainage and fertility. Most grow slowly at first and do not provide much erosion protection or compete much with weeds until well-established. Seed should be drilled for best stands, inoculation with the proper Rhizobium strain helps assure nodule formation and good nitrogen fixation. **Other broadleaf species** include buckwheat, turnips, radishes and other members of the brassica plant family (the mustards).

There is a cover crop to fit just about every farming situation. Sometimes it's obvious where and when to use a cover crop. For example, only legume cover crops will provide free nitrogen, but they are not very competitive against weeds. Slow-growing or short-statures cover crops are not particularly good candidates for needed supplemental forage.

Some Realities of Using Cover Crops in Iowa

In Iowa, the most frequent situation where cover crops are being used is between grain crops in a rotation. Corn and soybean are grown on about 90% of all cropland; this usually means that there is about a 6 or 7 months period between maturity of one grain crop and planting of the next where cover crops can be grown.

There are many cover crop plant species that could be used in this situation, but seasonal temperatures often limit the choices. The between-grain-crops period in Iowa is cold and soil is frozen part of the time. Four factors should be considered when selecting a cover crop: when can it be planted; does it grow well at cool temperatures; when is the average 'killing freeze' date; and does it overwinter. In Iowa the average 'killing freeze' (about 28 ºF or lower) date varies from Oct. 6 in northwest Iowa to Oct. 28 in southwest Iowa. In general cover crops species that do not overwinter or that need to be fairly large to overwinter should be planted at least 35 to 42 days before the average fall 'killing freeze' date. Oats and brassica cover crops (radishes, turnips, rapeseed, and mustards), which grow well at cool temperatures, usually do not overwinter in Iowa, and would fall in this category. Legumes, such as hairy vetch, red clover, and alfalfa, are also in this group because although they will overwinter in Iowa, they grow slowly after planting and need to be well established in the fall to overwinter. Other legumes like berseem clover and crimson clover grow rapidly, but do not overwinter. Annual ryegrass, which is a cool season annual forage grass, has not consistently overwintered in Iowa in the past. New annual ryegrass cultivars may prove to be more winter hardy, but they have not been tested extensively. Winter cereal grains such as winter rye (cereal rye), winter wheat, and winter triticale grow rapidly in cool weather and consistently overwinter. These winter-hardy cereals can be planted as much as 2 weeks after the average fall frost date.

Cover Crops for Supplemental Forage

Whether double cropping a forage cover crop between grain crops, or double cropping multiple forage crops in the same production year is a part of the management plan or is being implemented to deal with adverse weather conditions, farmers must select appropriate forage species and successfully manage them. As with all cover crops, timing and careful consideration of planting needs and harvest management are keys to successful forage double cropping and meeting forage supply needs.

The most popular choice for overwintering cereal crops for forage are winter rye and winter triticale. If planted and successfully established in mid to late- September, fall growth can provide ½ to 1 ton of dry matter of forage. Depending on how long the crop is permitted to grow the following spring, an additional 1 to 3 tons dry matter are possible as grazed or harvested forage. Where only fall growth for vegetative cover or forage are desired, oats, spring triticale or spring wheat can be sown. If planted and successfully established in mid to late- September, fall growth of these 'spring cereals' can yield 1 to 2 ½ tons of forage dry matter. The non-cold hardy 'spring cereals, planted in the fall can't match rye's or fall triticale's ability to put on growth in cold weather. These 'spring cereals' and annual ryegrass are good at scavenging available

nitrogen and other fertilizer nutrients that may be left over from fertilizer, manure applications, or mineralization of soil organic matter.

Fall-planted forage legumes, such as red clover or hairy vetch, and non-legume brassicas genially grow much more slowly, and produced much less grazable forage in the fall. Their value as vegetative cover and forage is improved if they can be planted in August, or even late July.

How are Small Grains and Other Cover Crops Established?

Cover crops can be overseeded into standing crops at crop maturity (leaf yellowing) by broadcasting seed above the main crop canopy. Overseeding into standing crops is a way to get a jump on the traditional winter cover crop season. It can lead to an increase in cover crop biomass production, and presumably better erosion control and more supplemental forage. Obviously, this technique is weather dependent and cover crops should not be seeded if the soil is dry or if a prolonged dry or hot period is forecast.

Broadcast overseeding can be done with airplanes, helicopters or high clearance ground-based equipment. After corn or soybean harvest, cover crop seed can be planted directly into the soil with a planter, grain drill, or broadcast and covered with light tillage depending on the cover crop species and seed size. Appropriate planting periods should be determined by considering average frost dates or using decision aides like the Midwest Cover Crops Council Selector Tool (see www URL reference listed below). Cover crops that are broadcast over a standing crop usually take longer (5-7 days) to establish and grow more slowly than cover crops planted directly in the soil, so they need to be planted earlier.

Managing Small Grain Cover Crops in the Spring

Management of overwintering cover crops in the spring is a compromise between maximizing the benefits of the cover crop and minimizing the yield risk to the following crop. The soil protection and forage benefits of the cover crop are maximized by allowing the cover crops to grow as long as possible before planting the main crop. The risks to the success of the following grain crop are minimized by killing the cover crop soon after it begins growth in the spring. To minimize the risk of reducing corn yield following overwintering grass cover crops they should be killed with glyphosate or by tillage at least 2 weeks prior to corn planting. If the spring is dry or the soil profile has not been recharged with water since harvest, then the cover crop should be killed as soon as it begins to regrow in the spring. For soybean following cover crops, the primary concern is depletion of soil water prior to planting. If soil water is adequate, killing the cover crop can be delayed until 5 to 7 days before planting soybean.

Cover Crops as 'Smother Crops' and for Soil Erosion Protection

Crops selected for rapid establishment and growth are most desirable for weed control and soil erosion protection. Weather conditions and cultural practices that encourage good stands and rapid early growth of smother crops are essential if they are to get a jump on weeds and effectively out-compete them. They must also 'fit' the production rotations. They may be used

between vegetable or grain crop sequences. Summer smother species include buckwheat, Japanese millet, and sorghum Sudan-grass. These crops require soil to be fully warmed in order to establish well. Spring- or fall-planted cool- season crops like oats, rye, vetch, or combinations can also smother weeds, besides protecting and improving soil. The key is quick and thick establishment, which is obtained with proper timing, seeding method that distribute seed evenly and cover it properly, and high seeding rates. Each crop choice and management has its own set of residue management issues. Some will be managed as "dead mulch", while others must be tilled or controlled using herbicides.

Are There Disadvantages When Using Cover Crops?

Increased Costs, Management, and Labor: Cover crops are a long-term investment in the soil, but they cost time and money to plant, manage, and kill. Seed cost and availability, and availability of seeding equipment are often important considerations and may determine the selection of cover crops.

Increased Risk of Main Crop Yield Reductions: Cover crops, especially winter cereals or other overwintering grass cover crops, can cause yield reductions in a following corn crop due to early spring water use, nitrogen immobilization, or rotation affects. These yield effects can be reduced or eliminated by killing grass cover crops at least two weeks before planting corn. Soybean yields are rarely reduced by cover crops unless soil water is limiting at planting.

Summary:

Each farmer needs to narrow their expectations to one or two primary and perhaps a few secondary goals to simplify the selection of the best cover species for their particular enterprise. Evaluate a cover crop's impact as you would any other crop, balancing costs against returns in all forms. Don't limit your calculations to the target cover crop benefit, also consider how it may adversely affect other components of the rotation. Timing and careful consideration of planting needs; and follow-up management are keys to cover crop success. Regional and site-specific factors can complicate cover crop management. Before planting a cover crop, learn as much as you can and talk to others who are experienced with that cover crop. Start small. Don't expect it to work great the first time. Keep working to improve the system.

Reference:
Managing Cover Crop Profitably –USDFA-SARE (read or down load the 244-pg PDF)
http://www.sare.org/Learning-Center/Books/Managing-Cover-Crops-Profitably-3rd-Edition

Midwest Cover Crops Council Cover Crop Decision Tools (A www-based, interactive cover crop evaluator) http://www.mccc.msu.edu/selectorINTRO.html

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